## REMARKS

Claims 1-10 are pending in the present application. Claims 1-10 are rejected. New claims 11 and 12 have been added. No new matter has been entered.

**Double Patenting**

Claims 1-8 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-8 of copending Application No. 10/487,865 in view of Burr et al. (EP 0739957 A1).

The Examiner asserts that the conflicting claims are not patentably distinct from each other because the subject matter claimed in the instant application is disclosed in the co-pending application and is covered by the co-pending application since the co-pending application and the application are claiming common subject matter. The Examiner admits that the co-pending application did not claim the ink for inkjet recording comprising at least one sugar alcohol containing not less than four OH groups, which is at least one selected from the group consisting of D-sorbitol, xylitol, and maltitol in an amount from 0.5 to 50% by weight.

The Examiner concludes that it would have been obvious to modify the ink composition of pending application (289) by Burr et al. in order to have a high quality printed image.

Applicants respectfully disagree with the rejection, because not all of the claimed limitations are suggested by the cited combination of references.

According to the present invention, an ink composition having a high redispersion property is obtained by adding the compound of the chemical formula (I) to a dispersion in

which a sublimation dye is dispersed to form fine particles in the aqueous medium with a dispersant, and the sugar alcohol containing not less than four OH groups is used as a humectant to reduce the content of the water-soluble organic solvent as much as possible, so that an environmentally oriented sublimation dye ink can be made suitable for practical use.

Applicants note that the co-pending application (US Application serial No. 10/487,865) discloses the use of a sublimation dye, but is silent about the idea that the content of the water-soluble organic solvent should be reduced as much as possible to provide an environmentally oriented sublimation dye ink and its solution, which is the object of the present invention. Therefore, the co-pending application does not disclose or suggest that the "sugar alcohol containing not less than four OH groups" is used as a humectant to reduce the content of the water-soluble organic solvent as much as possible and provide an environmentally oriented sublimation dye ink.

Furthermore, although Burr et al. disclose an ink jet ink that uses a sugar alcohol as a binder, the ink is merely a dissolution type ink including the colorant as a coloring material that is soluble in the liquid vehicle, a special ampholytic surface active agent, and the sugar alcohol as a binder that is soluble in the liquid vehicle. Therefore, Burr et al. do not disclose or suggest that a sugar alcohol containing not less than four OH groups may be used as a humectant in an aqueous dispersion type ink, in which the sublimation dye that is difficult to be solved in water is dispersed to form fine particles in the aqueous medium with a dispersant. Burr et al. also is silent about the idea that the content of the water-soluble organic solvent

should be reduced as much as possible to provide an environmentally oriented sublimation dye ink and its solution, which is the object of the present invention.

Applicants submit that there is no motivation to apply the teaching of Burr et al. to the co-pending application for ***modifying*** it into the present invention. Thus, the present invention is would not have been obvious to a person skilled in the art, and the obviousness-type double patenting is not applicable.

**Claim Rejections - 35 U.S.C. §103(a)**

Claims 1-8 are rejected under 35 U.S.C. §103(a) as being unpatentable over Burr et al. (EP 0739957 A1) in view of Breton et al. (US 5484475).

The Examiner asserts that Breton et al. teaches inkjet ink composition includes a hot melt ink (sublimation) and ethoxylate alcohols are the general formula $CH_3$-$(CH_2$-$CH_2)_x$-$CH_2$-O-$(CH_2$-$CH_2$-$O)_n$-H, wherein n is 2 to 41 (column: 7, line: 44-50), and having a HLB value 2 to 18 (column: 7, line: 57-65) and in an amount from 2 to 15% by weight (column: 8, line: 1-6). The Examiner concludes that it would have been obvious to have modified the ink composition of Burr et al. by the aforementioned teaching of Breton et al. in order to have a rapid drying ink and high quality print.

Applicants note that in order to establish a *prima facie* case of obviousness, three basic criteria must be met. First, the prior art reference (or references when combined) must teach or suggest all the claim limitations. Second, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the

art, to modify the reference or to combine reference teachings. Finally, there must be a reasonable expectation of success. (Manual of Patent Examining Procedure §2142). The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on Applicant's disclosure.

Applicants respectfully disagree with the above rejection because one skilled in the art would not have made the above combinations.

Applicants note the following with respect to the present invention.

The conventional sublimation transfer dyeing method requires heating for a predetermined time at temperatures higher than the sublimation point of the sublimation dye. Therefore, particularly for a high-boiling organic solvent such as glycerin, the temperature is reduced to a condensation point shortly after the evaporated solvent is released into the atmosphere, thus causing smoky steam. This is considered to be undesirable because the appearance becomes extremely worse. One possibility for avoiding such a problem is to use a solvent having a low-boiling point that does not cause any smoky steam. However, the solvent having a low-boiling point is the same as the organic solvent having a high-boiling point in release of the evaporated solvent into the atmosphere. In either case, therefore, environmental pollution (e.g., working environment) is a problem. See page 2, lines 5-17 of the specification.

To solve the above problems of a conventional ink for ink jet recording that includes a sublimation dye, an object of the present invention is to provide an ink for ink jet recording that not only can reduce environmental pollution and maintain required performances such as storage stability and high-quality recording images, but also can effectively prevent nozzle

clogging, exhibit good dispersion stability, and achieve a high redispersion property that ensures stable ejection both during long continuous operation and after stopping the operation of an apparatus for a long time. Another object of the present invention is to provide a sublimation transfer dyeing method using this ink. See page 4, lines 11-20 of the specification.

According to the present invention, sublimation dye is dispersed using the dispersant, and the sugar alcohol containing not less than four OH groups is included as a humectant in the ink having the chemical formula (I), thereby making the amount of water-soluble organic solvent as small as possible to achieve an environmentally oriented sublimation dye ink. See page 6, lines 20-24 of the specification.

The Examiner asserts that Burr et al. differs from the presently claimed invention only in that the ink including a compound expressed by the chemical formula $R\text{-}O(CH_2CH_2O)_n\text{-}H$, wherein R is an alkyl group having a carbon number of 25 to 150 and n is from 2 to 100, and having HLB not less than 10 and an amount from 0.1 to 8% by weight.

However, Applicants submit for the following reasons that Burr et al. (EP 0739957 Al) would not have been combined to reach the present invention.

Applicants note that Claims 1, 2 and 4 of Burr et al. recite as follows:

1. An ink jet ink comprising a liquid vehicle, 1 to 20% by weight of a binder which is soluble in the liquid vehicle, a colorant which is soluble in the liquid vehicle and a surfactant comprising at least 95% of phosphatidylcholine or lysophosphatidylcholine, and the said surfactant being present in an amount such as to provide from 0.05 to 1.0% phosphatidylcholine

or lysophosphatidylcholine or mixtures thereof, which is soluble in the liquid vehicle, the binder being selected from the group consisting of a sugar, a sugar alcohol and a mixture thereof.

2. An ink jet ink as claimed in claim 1 in which the liquid vehicle is a blend of a lower alkanol and water in a weight ratio of 25/75 to 90/10.

4. An ink jet ink as claimed in claim 1, 2 or 3 in which the sugar alcohol is sorbitol or maltitol.

Applicants note that Although Burr et al. disclose an ink jet ink that uses a sugar alcohol as a binder, the ink is merely a dissolution type ink including the colorant as a coloring material that is soluble in the liquid vehicle, a special ampholytic surface active agent, and the sugar alcohol as a binder that is soluble in the liquid vehicle. Therefore, the ink of Burr et al. is substantially different chemically from the ink of the present invention in which the sublimation dye that is difficult to be solved in water is dispersed in an aqueous medium with a dispersant. Burr et al. describe "it was decided to use soluble dyes rather than pigments to avoid blockage problems in the ink jet printer" (see page 13, line 20). Moreover, "when the dyes were used in full ink formulations it was found unexpectedly that greater amounts of colorants could be brought into solution and held stable therein in the presence of the sorbitol" (see page 14, lines 13-14). As is evident from these descriptions, sorbitol improves the solubility of dyes in the dissolution type ink including the colorant that is soluble in the liquid vehicle. However, Burr et al. do not teach the effect of sorbitol used in a dispersion type ink including a pigment, but rather merely refer to the blockage problems that may arise in the dispersion type ink (see page 13, line 20). This completely contradicts the present invention. Upon using the sublimation dye of the

present invention, if the dye was dissolved, it would not be dispersed uniformly to cause aggregation or precipitation, and thus could not be used as an ink.

Burr et al. do not disclose or suggest that a sugar alcohol containing not less than four OH groups may be used as a humectant in an aqueous dispersion type ink, in which the sublimation dye that is difficult to be solved in water is dispersed to form fine particles in the aqueous medium with a dispersant.

The ink of the present invention also includes the compound expressed by the chemical formula (I). However, Burr et al. do not disclose or suggest that an ink composition having a high redispersion property is obtained by adding the compound of the chemical formula (I) to a dispersion in which the sublimation dye is dispersed to form fine particles in the aqueous medium with a dispersant, and that the sugar alcohol containing not less than four OH groups is used as a humectant to reduce the content of the water-soluble organic solvent as much as possible and provide an environmentally oriented sublimation dye ink.

Applicants note the following comparison of Breton et al. (US 5,484,475) and the present invention. Claims 1, 2 and 20 of Breton et al. recite as follows:

1. An ink composition consisting essentially of water, a colorant, an organic component miscible with water, and micelles which comprise an ethoxylated alcohol (including a compound expressed by the chemical formula (I) of the present application).

2. An ink composition according to claim 1, wherein the colorant is a water soluble dye.

20. A process for preparing an aqueous ink composition which comprises (a) admixing an ethoxylated alcohol with a water-miscible organic liquid at a temperature at or above the melting point of the ethoxylated alcohol to prepare a saturated solution of the ethoxylated alcohol in the organic liquid; (b) cooling the solution thus formed, thereby obtaining a solid solution with a melting point of from about 30°C to about 80°C; (c) admixing the saturated solution thus prepared with a mixture containing water and a water soluble dye at a temperature equal to or higher than the melting point of the ethoxylated alcohol solution, thereby resulting in an ink composition containing micelles which comprise the ethoxylated alcohol.

Applicants note that Breton et al. disclose an ink composition including water, a colorant, an organic component miscible with water, and micelles that contain an ethoxylated alcohol. Among the components of the ink composition of the present invention, Breton teaches water and the compound of the chemical formula (I).

Although various dyes and pigments may be used as the colorant in Breton et al., all the specific examples of the dyes are water-soluble dyes, and again no sublimation dye is disclosed (see column 5, line 66 to column 7, line 42). The hot melt ink indicated by the Examiner uses DIRECT BLUE 199, which is a kind of the water-soluble dyes, as described in Examples IV, V and VI. This dye is not a sublimation dye, and thus Breton et al. fail to disclose a sublimation dye.

As the organic component miscible with water, glycols such as butyl carbitol are disclosed and used to dissolve the compound of the chemical formula (I) (see column 8, lines 12-36). Breton et al. do not refer to any problem in using the water-soluble organic solvents.

Moreover, unlike the present invention, Breton et al. neither disclose nor suggest an environmentally oriented sublimation dye ink while reducing the content of the water-soluble organic solvent as much as possible.

Breton et al. describe several examples including a water-soluble resin as other additives. However, they are used to increase the viscosity, and no dispersant is disclosed, except for the ethoxylated alcohol (see column 8, lines 37-18).

For the sublimation dye, coarse particles should be pulverized into fine particles. However, even if the pulverization is performed on the compound of the chemical formula (I), without using any dispersant the resultant particles are not sufficiently fine, as disclosed in Comparative Example 4 of the present invention. Thus, it is not possible to produce a stable dispersion type ink.

Accordingly, Breton et al. do not disclose or suggest that an ink composition having a high redispersion property is obtained by adding the compound of the chemical formula (I) to a dispersion in which the sublimation dye is dispersed to form fine particles in the aqueous medium with a dispersant, and that the sugar alcohol containing not less than four OH groups is used as a humectant to reduce the content of the water-soluble organic solvent as much as possible and provide an environmentally oriented sublimation dye ink.

Applicants note the following comparison of the present application with Burr et al. (EP 0739957 Al) and Breton et al. (US 5,484,475).

As described above, although Burr et al. disclose an ink jet ink that uses a sugar alcohol as a binder, the ink is merely a dissolution type ink including the colorant as a coloring material

that is soluble in the liquid vehicle, a special ampholytic surface active agent, and the sugar alcohol as a binder that is soluble in the liquid vehicle. Therefore, Burr et at do not disclose or suggest that a sugar alcohol containing not less than four OH groups may be used as a humectant in an aqueous dispersion type ink, in which the sublimation dye that is difficult to be solved in water is dispersed to form fine particles in the aqueous medium with a dispersant.

As described above, Breton et al. disclose an ink composition including water, a colorant, an organic component miscible with water, and micelles that contain an ethoxylated alcohol. Among the components of the ink composition of the present invention, Breton teaches water and the compound of the chemical formula (I). However, all the specific examples of the dyes are water-soluble dyes, and no sublimation dye is disclosed. Breton et al. do not refer to any problem in using the water-soluble organic solvents. Moreover, Breton et al. neither disclose nor suggest an environmentally oriented sublimation dye ink while reducing the content of the water-soluble organic solvent as much as possible. Thus, unlike the present invention, Breton et al. do not disclose or suggest that an ink composition having a high redispersion property is obtained by adding the compound of the chemical formula (I) to a dispersion in which the sublimation dye is dispersed to form fine particles in the aqueous medium with a dispersant, and that the sugar alcohol containing not less than four OH groups is used to reduce the content of the water-soluble organic solvent as much as possible and provide an environmentally oriented sublimation dye ink.

Accordingly, there is no motivation to modify the technique of Breton et al. and the ink composition of Burr et al., and we believe claims 1-8 of the present invention cannot be derived easily from these references.

Claims 1-10 are rejected under 35 U.S.C. §103(a) as being unpatentable over Herrmann et al. (US 6607565) in view of Burr et al. (EP 0739957 A1) and Breton et al. (US 5484475).

The Examiner asserts that Herrmann et al. differs from the claim of the present invention in that (1) the ink includes at least one sugar alcohol containing not less than four OH groups, which is selected from D-sorbitol and maltitol in an amount of 0.5 to 50% by weight; and (2) the ink includes a compound expressed by the chemical formula R-O-$(CH_2CH_2O)_n$-H, wherein R is an alkyl group having a carbon number of 25 to 150 and n is from 2 to 100, and having HLB not less than 10 and an amount from 0.1 to 8% by weight.

The Examiner concludes that it would have been obvious for one to have modified the ink composition of Herrmann et al. by the aforementioned teaching of Burr et al. in order to have a high quality printed image. The Examiner further concludes that it would have been obvious to have modified the ink composition of Herrmann et al. by the aforementioned teaching of Breton et al. in order to have a rapid drying ink and high quality print.

Applicants respectfully disagree with the rejection because as noted above, one skilled in the art would not have combined Burr et al. and Breton et al. and subsequently modified them to reach the present invention. Applicants note their discussion of Burr et al. and Breton et al. above.

Applicants further note the following with respect to Herrmann et al. (US 6,607,565) and the present invention. Applicants note that claims 1, 2, 3, 4, and 5 of Herrmann et al. include the following features.

1. A method of printing, comprising: printing a substrate by the inkjet process employing an ink which is a dye preparation comprising, (i) based on the weight of the preparation, from 0.1 to 30% by weight of at least one dye selected from the group consisting of anthraquinones or quinophthalones which are free of ionic groups, and (ii) from 0.1 to 20% by weight of a dispersant which is an arylsulfonic acid-formaldehyde condensation product ... , or from 0.1 to 20% by weight of a water-soluble dispersant based on alkoxylated phenols, and (iii) from 10 to 90% by weight of a mono- or polyhydric alcohol or mixtures thereof and optionally water ...

2. The method according to claim 1, which comprises, based on the weight of the preparation, of 1 to 15% by weight of at least one dye selected from the group consisting of anthraquinone or quinophthalone and from 0.5 to 10% by weight of dispersant.

3. The method according to claim 1, wherein the mono- or polyhydric alcohol is an alkane monool or polyol having from 2 to 8 carbon atoms and up to 4 alcoholic hydroxyl groups.

4. The method according to claim 1, wherein the dye preparation contains particles of dye, 99% of which are of a size smaller than 1 μm.

5. A method of printing, comprising: printing a substrate by the sublimation transfer process employing an ink which is a dye preparation comprising, ...

Applicants note that Herrmann et al. describe "suitable mono- or polyhydric alcohols are generally alkane monools or polyols, especially polyols, having from 2 to 8 carbon atoms, preferably from 2 to 6 carbon atoms, and up to 4, preferably from 2 to 4, alcoholic hydroxyl groups. Examples are 1,2-ethanediol, 1,2-propanediol, 1,3-propanediol, glycerol, 1,2,5-pentanetriol and 1,2,6-hexanetriol" (see column 6, line 66 to column 7, line 5).

In the examples 1-12, 1,2-ethanediol (hereinafter: glycol) is used as mono- or polyhydric alcohols, and Tables 1, 3 and 6 show the content of the dye preparation of each example. The glycol content in each example is 36.25 to 72.5%.

Herrmann et al. disclose an ink composition that includes 0.1 to 30% by weight of a particular disperse dye, 0.1 to 20% by weight of a particular anionic dispersant, 10 to 90% by weight of a mono- or polyhydric alcohol and optionally water. Herrmann et al. also discloses a sublimation transfer process using the ink composition. However, Herrmann et al. require 10 to 90% by weight of a mono- or polyhydric alcohol, and particularly use a large amount of 1,2-ethanediol (corresponding to "glycol" in of the cited reference) in all the examples. In other words, this ink substantially includes a water-soluble organic solvent. Therefore, Herrmann et al. do not disclose an environmentally oriented ink composition while reducing the content of the water-soluble organic solvent as much as possible, which is the object of the present invention. Moreover, the effect of the present invention cannot be obtained by using a mono- or polyhydric alcohol as large as 10 to 90% by weight.

Accordingly, Herrmann et al. do not disclose or suggest that an ink composition having a high redispersion property is obtained by adding the compound of the chemical formula (I) to a

dispersion in which the sublimation dye is dispersed to form fine particles in the aqueous medium with a dispersant, and that the sugar alcohol containing not less than four OH groups is used as a humectant to reduce the content of the water-soluble organic solvent as much as possible and provide an environmentally oriented sublimation dye ink.

Applicants note the following comparison of the present application with Herrmann et al (US 6,607,565), Burr et al. (EP 0739957 Al) and Breton et al. (US 5,484,475).

As described above, Herrmann et al. disclose an ink composition that includes 0.1 to 30% by weight of a particular disperse dye, 0.1 to 20% by weight of a particular anionic dispersant, 10 to 90% by weight of a mono- or polyhydric alcohol and optionally water. Herrmann et al. also discloses a sublimation transfer process using the ink composition. However, Herrmann et al. require 10 to 90% by weight of a mono- or polyhydric alcohol, and particularly use a large amount of 1,2-ethanediol (corresponding to "glycol" of the cited reference) in all the examples. In other words, this ink substantially includes a water-soluble organic solvent. Therefore, Herrmann et al. do not disclose an environmentally oriented ink composition while reducing the content of the water-soluble organic solvent as much as possible, which is the object of the present invention. Moreover, the effect of the present invention cannot be obtained by using a mono- or polyhydric alcohol as large as 10 to 90% by weight.

Accordingly, Herrmann et al. do not disclose or suggest that an ink composition having a high redispersion property is obtained by adding the compound of the chemical formula (I) to a dispersion in which the sublimation dye is dispersed to form fine particles in the aqueous

medium with a dispersant, and that the sugar alcohol containing not less than four OH groups is used to reduce the content of the water-soluble organic solvent as much as possible and provide an environmentally oriented sublimation dye ink.

Neither Burr et al. nor Breton et al. disclose or suggest that an ink composition having a high redispersion property is obtained by adding the compound of the chemical formula (I) to a dispersion in which the sublimation dye is dispersed to form fine particles in the aqueous medium with a dispersant, and that the sugar alcohol containing not less than four OH groups is used to reduce the content of the water-soluble organic solvent as much as possible and provide an environmentally oriented sublimation dye ink.

Thus, there is no motivation to modify the ink composition of Herrmann et al. with the technique of Burr et al., and therefore claims 1-10 of the present invention would not have been derived from these references.

Similarly, there is no motivation to modify the ink composition of Herrmann et al. with the technique of Breton et al., and therefore claims 1-10 of the present invention would not have been derived from these references.

In view of the aforementioned amendments and accompanying remarks, Applicants submit that that the claims, as herein amended, are in condition for allowance. Applicants request such action at an early date.

If the Examiner believes that this application is not now in condition for allowance, the Examiner is requested to contact Applicants' undersigned attorney to arrange for an interview to expedite the disposition of this case.

If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,

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